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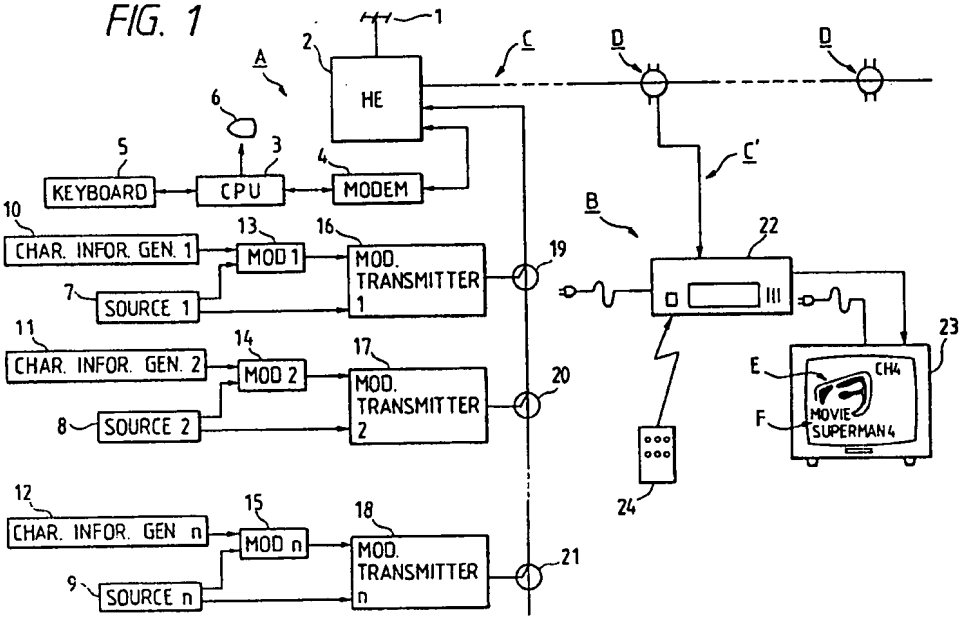
UK CL (Edition J) H4F FBB FGG FGH FGJ FGS FGT
INT CL[4] H04N

(54) CATV display with superimposed character information

(57) A CATV system provides character information along with selected transmitted television programs whereby the character information is displayed on the subscriber television screen 23 along with the television program, thereby giving the subscriber a title or other information about the television program. At the central station A, character data is generated for locally produced programs, e.g., newly released movies produced from a video disk or tape, and the character data is AM modulated onto the audio portion of the corresponding television signal. At the receiver B the character data is detected and controls a character generator that generates character information for display on the television screen. A remote control 24 function may turn on/off the character generation function at the receiver.

FIG. 1



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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FIG. 1

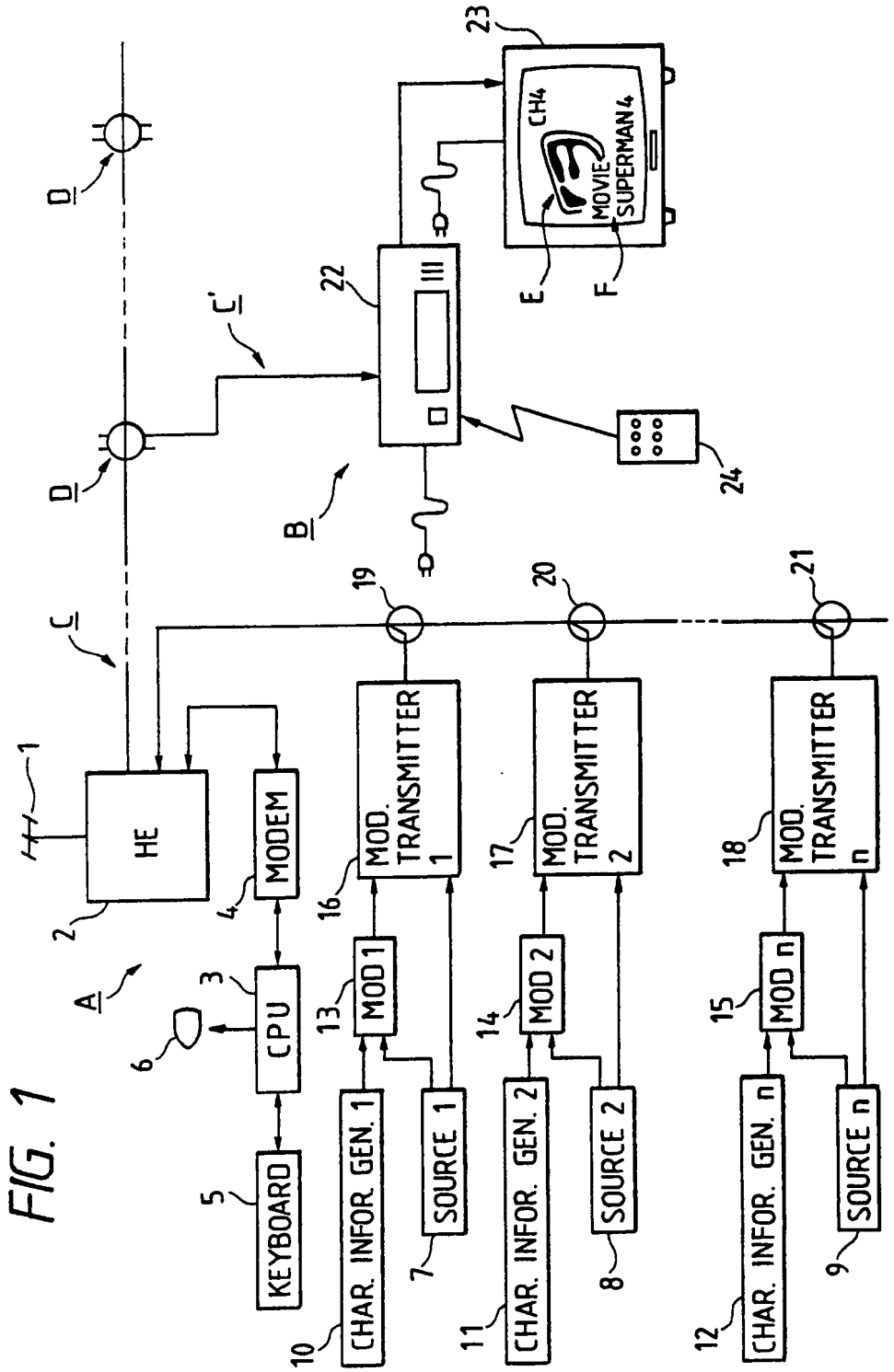

HE
MODEM
CPU
KEYBOARD
CHAR. INFOR. GEN. 1
SOURCE 1
MOD 1
MOD. TRANSMITTER 1
CHAR. INFOR. GEN. 2
SOURCE 2
MOD 2
MOD. TRANSMITTER 2
CHAR. INFOR. GEN. n
SOURCE n
MOD n
MOD. TRANSMITTER n
CH4
MOVIE
SUPERMAN4
A
B
C
C'
D
E
F

FIG. 2

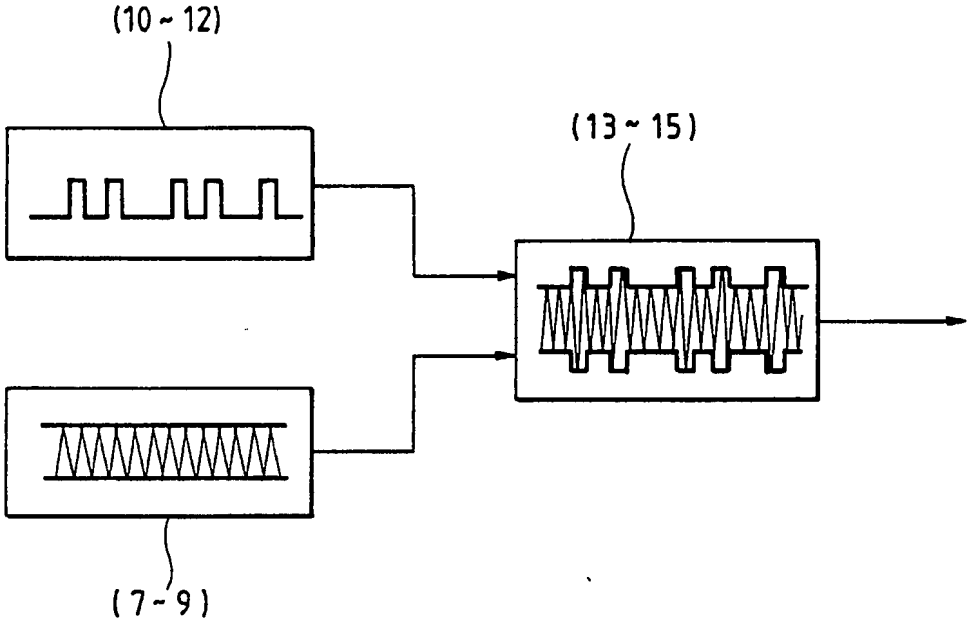
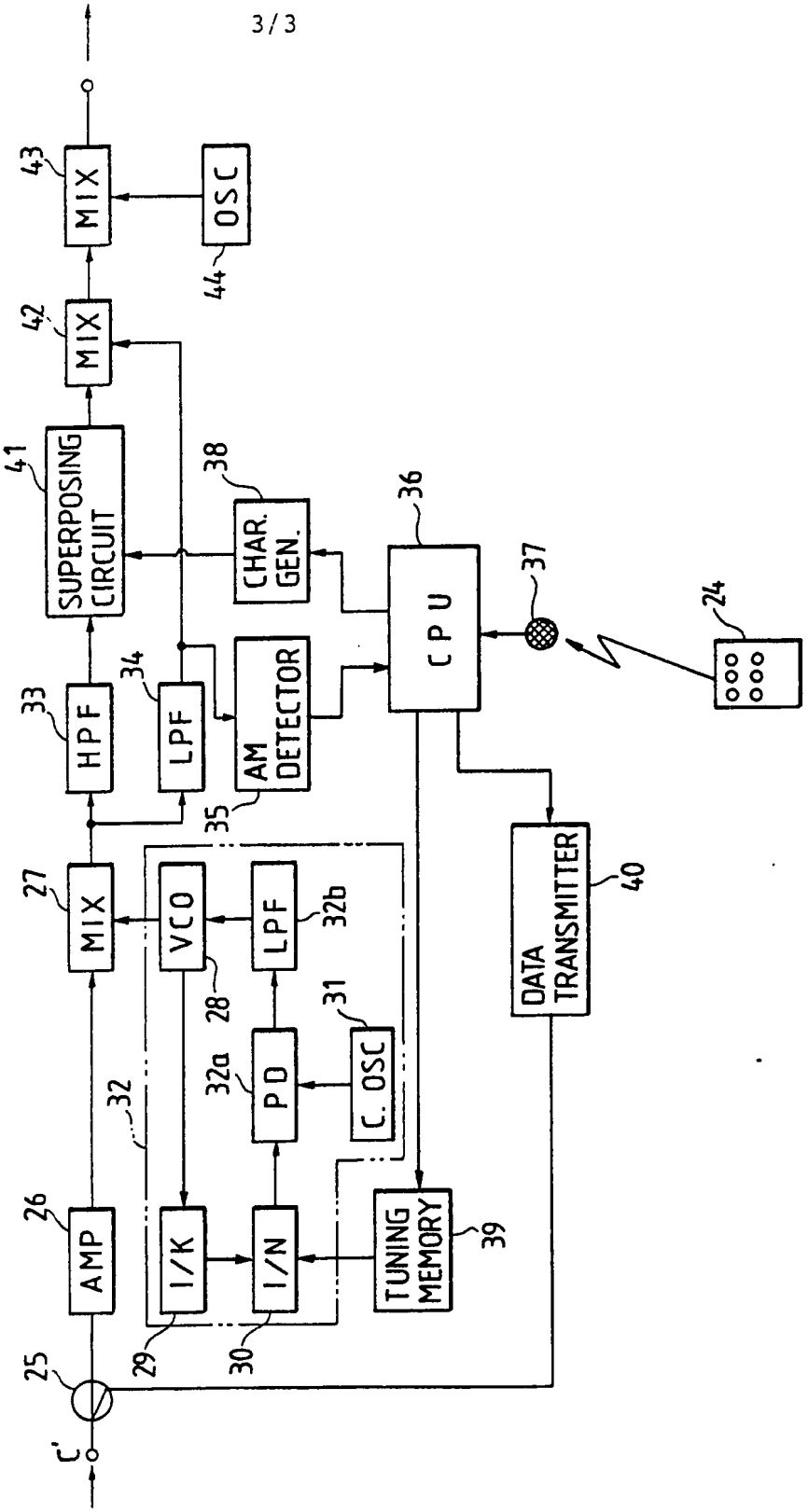


FIG. 3


C'
25
AMP
26
MIX
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32
I/K
29
I/N
30
VCO
28
PD
32a
LPF
32b
C. OSC
31
TUNING MEMORY
39
DATA TRANSMITTER
40
HPF
33
LPF
34
AM DETECTOR
35
SUPERPOSING CIRCUIT
41
CHAR. GEN.
38
CPU
36
37
24
MIX
42
MIX
43
OSC
44

CATV SYSTEM AND RECEIVING TERMINAL UNIT THEREFOR

The invention relates to a CATV system and a receiving terminal unit therefor in which character information related to an individual television signal source is transmitted from a central station, and in each terminal unit a character image based on the demodulated character information is superimposed on a received video signal. The character information is transmitted, for example, as in-band data.

CATV systems are, in general, configured such that a central station is connected to a number of receiving terminal units provided at subscribers' homes, and on-air signals received by the central station or programs produced at the central station are transmitted to television receivers connected to the terminal units at the subscribers' homes so that the subscribers can reproduce the signals and watch the programs.

In such a system, programs which are received over the air and retransmitted to subscribers are free of charge to subscribers (except for a basic subscriber monthly fee), and any program independently produced in the central station and some newly issued movies typically are provided for a fee so that CATV operating companies can gain additional profits.

For various reasons, and particularly due to the plethora of programming available, it sometimes happens

that the contents of a program being currently watched (e.g., the title of the program) cannot easily be identified by the subscriber by simply viewing the image displayed on or sound reproduced by the television receiver, and therefore, the subscriber will search for a desired program by continuous channel switching.

The subscriber, however, may find it difficult to associate the sequentially displayed image or reproduced sound of each of the channels with the title or contents of the program, and this makes it likely that the subscriber will skip the desired program and switch to other channels.

Generally, newly arrived movies or the like attract attention of many subscribers. These programs are often broadcast as chargeable programs by the CATV operating companies. The fact that the subscribers have difficulty in finding programs in which they are interested means that viewer ratings of chargeable programs may be reduced, and this causes a profit loss for the CATV operating companies.

The invention described herein is made in view of the above problems, and an object of the invention is to provide a CATV system and a receiving terminal unit therefor which can provide an advantage to subscribers in that a subscriber can easily identify a program from character information superimposed on a displayed picture image. The character information may include such

information as the title of a program or content information about the program.

A CATV system and a receiving terminal unit therefor according to the invention are constructed such that character information related to an individual television signal source (i.e., program) is transmitted from the central station by being multiplexed on the television signal, and the character information is detected at the receiver and converted into a character image by a character generator and displayed superimposed on the television screen.

In the drawings:-

Fig. 1 is a block diagram of a preferred embodiment of a CATV system according to the present invention;

Fig. 2 is a block diagram for explaining a part of the operation of Fig. 1; and

Fig. 3 is a block diagram of a preferred embodiment of a terminal unit according to the present invention.

Fig. 1 is a block diagram explaining the CATV system according to this invention. This system comprises a number of terminal units B connected to a central station A via a cable C. From the central station A, a trunk cable C is extended, and drop cables C', branched out from branching devices D provided at predetermined points along

the trunk cable C, are connected to the respective terminal units B at subscribers' homes.

The central station A comprises a head end 2 for frequency-converting and transmitting on-air signals obtained from an outdoor antenna 1 and for transmitting television signals obtained from a tape recorder or a video disk reproducer (not shown). These on-air and locally produced television signals are transmitted by the head end to the terminal units.

A modem 4 for converting data between each terminal unit B and a center computer 3 is connected to the head end 2. An externally connected unit 5 such as a keyboard for giving an instruction to the computer 3, and a display unit 6 for monitoring operating conditions or data are connected to the computer 3.

The computer 3 calculates the charges based on the time and kind of the chargeable programs watched at each terminal unit, accumulates the data, and issues a bill via an externally connected printer from time to time.

A plurality of modulators 13-15 are provided. Each modulator is connected to a respective one of signal sources 7-9 and to a respective character information generator 10-12. Each modulator extracts audio signals from its corresponding signal source and multiplexes the character data from its corresponding character information generator onto the audio signals. The signal sources may be video tape or disk recorders or reproducers for providing television signals. The character data from a

character information generator is related to the signals from the associated signal source.

The character data amplitude modulates the audio signals in the modulators 13-15, and the outputs therefrom are applied to the respective transmitters 16-18. The video signals from signal sources 7-9 are also applied to the respective transmitters 16-18, where the video and amplitude modulated audio signals are mixed and frequency converted to respective RF frequencies and forwarded via mixers 19-21 to the head end for transmission along the cable C together with on-air television signals.

Fig. 2 is a block diagram explaining the operation of the modulators 13-15. FM audio signals are extracted from the television signals produced by signal sources 7-9 and then amplitude modulated with the respective outputs of the character information generators 10-12.

Referring back to Fig. 1, each of the terminal units B basically comprises a terminal box 22 provided at a subscriber's home and a television receiver 23 connected to the terminal box 22. The terminal box 22 is supplied with a remote control commander 24, if necessary, so that various programs can be selected thereby.

Fig. 3 is a block diagram showing an example of the terminal box 22 in the terminal unit B.

A television signal transmitted via the cable C' is supplied to an RF amplifier 26 via a branching device 25 and applied to a mixer 27. The mixer 27 has connected thereto a commonly known PLL circuit 32 (tuner section),

which comprises a voltage control oscillator 28, a prescaler 29, a programmable divider 30, a crystal oscillator 31, a phase detector 32a and a low-pass filter 32b.

The PLL circuit 32 constitutes a first local oscillator. A tuned intermediate frequency output from mixer 27 is applied to a high-pass filter 33 and a low-pass filter 34, and is separated into a video signal and an audio signal. The audio signal obtained by the low-pass filter 34 is applied to an AM detector 35, which detects the character data modulated onto the audio signal. Demodulated character information obtained by the AM detector 35 is applied to an operation control circuit 36. The operation control circuit 36 has connected thereto a light receiving section 37 for receiving an output from the remote control commander 24. The operation control circuit 36 supplies the demodulated character information to a character generator 38 by decoding a remote control code. Also, the operation control circuit 36 receives a channel selection instruction from the commander 24 and accordingly transmits tuning data to a tuning memory 39 to make the PLL circuit 32 perform a tuning control function.

Also, the data corresponding to the tuning information is transmitted from the operation control circuit 36 to a data transmitter 40, which then transmits the data of the selected channel (e.g., channel i.d.) to the center A via the branching device 25 together with terminal unit address data.

Upon application of the demodulated character information to the character generator 38, character image information corresponding to the character information is generated therein. The character image information generated by the character generator 38 is superimposed on the video signal from the high-pass filter 33 by a superimposing circuit 41, and further mixed with the audio signal obtained from the low-pass filter 34 by a mixer 42.

The output of the mixer 42 is converted to an RF empty channel frequency (typically channel 3 in many regions of the United States), by being mixed with an output of a second local oscillator 44 by a mixer 43 and transmitted to the output line which is connected to the television receiver 23.

Thus, on the television receiver 23, a character image F indicating the title or contents of a program is displayed while superimposed on an image E of the program tuned by the terminal unit as shown in Fig. 1. The character image F may be displayed in superimposed form or erased with a remote control operation at the request of the subscriber.

It is noted that the character information corresponding to a program may include a name of the CATV station, the information such as monaural, stereo or bilingual, the ending time, or the preliminary announcement (including a broadcasting time) of the next week broadcast.

It will be readily apparent to anyone of ordinary skill in the CATV field that CATV systems for performing

all but the character generation, transmission, decoding, display, etc., functions described above are common. Also, individual circuits which are capable of generating character data representing desired character information, and for generating character information for an image display from detected character data are known. Further, it will be apparent that the addition of one more control to a remote commander, which control would trigger the CPU 36 to turn on/off character display is also well within the ordinary skill of the art.

As is clear from the above description, according to this invention, character information corresponding to a television signal is multiplexed on, e.g., an audio signal of the television signals and is transmitted from the central station. In the terminal unit, the character information is detected from, e.g., the audio signal to drive a character generator and superimpose a character image obtained by the character generator on a tuned television image, thereby providing a subscriber with the advantage that he or she can judge instantly whether or not the program is worth viewing based on the character image.

This invention also provides the economic advantage to CATV operating companies that they may be able to attract more subscribers to their chargeable programs than before.

Further, this invention allows a new CATV system to be built by adding a function of transmitting character information to the existing central station, and by adding a function of demodulating in-band data and a character

generator for reproducing a character image, etc., to the existing terminal unit, whereby a new CATV system can be built considerably inexpensively.

CLAIMS.

1. A CATV system of the type having a central station for transmitting to multiple subscriber stations a plurality of television programs, comprising:

character data generator means at said central station for generating respective character data for respective selected television programs to be transmitted by said central station, said character data for any given television program representing information related to said television program;

combining means at said central station for combining said character data with its corresponding television program, whereby said combined television program and character data is transmitted to said subscriber stations;

channel selection means at each said subscriber station for selection of a television program from among those received at said subscriber station; and

character generation and display control means responsive to character data combined with said selected television program for superimposing character information corresponding to said character data on a television program image.

2. A CATV system as claimed in claim 1, wherein said combining means comprises amplitude modulator means for amplitude modulating the said character data onto the audio signal portion of a corresponding television program.

3. A CATV system as claimed in claim 1, wherein said character generator means comprises a plurality of character data generator, one for each television signal source for which character information is to be provided; and further comprising a plurality of television signal sources for generating respective television signals, each having a video and an audio portion; and wherein said combining means comprises, a plurality of amplitude modulators, one for each character generator and television signal source; each said amplitude modulator connected to a respective character generator and television signal source for amplitude modulating the character data from said character generator onto the audio signal portion from said television signal source.

4. A CATV system as claimed in claim 3, wherein said character generation and display control means comprises:

audio signal separator means for separating out the audio signal portion of said selected television program;

character detector means for demodulating said character data from the separated audio signal portion of said selected television program; and

character generator means responsive to said demodulated character data for generating character information suitable for display on a television screen superimposed over a television image of the corresponding television program.

5. A CATV system as claimed in claim 4, further comprising at said subscriber station remote control means for controlling the on/off status of said character generation.

6. A converter unit for reception of CATV signals representing multiple television programs, each said television program being constituted by a video signal portion and an audio signal portion, and selected television programs also being constituted by character data multiplexed with said video and audio signal portions and representing information related to said television program and suitable for superimposing presentation on a television receiver screen, said converter unit comprising:

channel selection tuner means for selecting a television program to be viewed from said received CATV signals;

character data detection means for detecting any character data multiplexed with said selected television program signal; and

character generator means responsive to said detected character data for generating character information in a form suitable for display on a television screen superimposed over a television image of said television program signals to provide the viewer with information related to said television program.

7. A converter unit as claimed in claim 6, wherein said character data is amplitude modulated onto the audio signal portion of a television program signal, and wherein said character data detection means comprises:

means for separating the audio signal portion of a television program signal from said selected television program signal; and

an AM demodulator for demodulating said separated audio signal portion to provide demodulated character data.

8. A converter unit as claimed in claim 7, further comprising remote control signal responsive means responsive to a remote signal representing character display on/off for controlling the on/off state of said character generator means.

9. A CATV system substantially as described with reference to the accompanying drawings.

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